

General

Guideline Title

ACR Appropriateness Criteria® pulsatile abdominal mass, suspected abdominal aortic aneurysm

Bibliographic Source(s)

Desjardins B, Rybicki FJ, Dill KE, Flamm SD, Francois CJ, Gerhard-Herman MD, Kalva SP, Mansour MA, Mohler ER III, Oliva IB, Schenker MP, Weiss C, Expert Panel on Vascular Imaging. ACR Appropriateness Criteria® pulsatile abdominal mass, suspected abdominal aortic aneurysm. [online publication]. Reston (VA): American College of Radiology (ACR); 2012. 6 p. [65 references]

Guideline Status

Note: This guideline has been updated. The National Guideline Clearinghouse (NGC) is working to update this summary.

Recommendations

Major Recommendations

Note: This guideline has been updated. The National Guideline Clearinghouse (NGC) is working to update this summary. The recommendations that follow are based on the previous version of the guideline.

ACR Appropriateness Criteria®

Clinical Condition: Pulsatile Abdominal Mass, Suspected Abdominal Aortic Aneurysm

Radiologic Procedure	Rating	Comments	RRL*
US aorta abdomen	9	Initial examination. May be limited by body habitus or acoustic window.	O
CT abdomen without contrast	8	Preferred for symptomatic patients. Suitable for patients in whom US is not useful.	⚠⚠⚠
CTA abdomen with contrast	7	Also enables preinterventional planning.	⚠⚠⚠
MRA abdomen without contrast	6	Alternative to CTA. Unable to detect calcium. Site-specific expertise important.	O
MRA abdomen without and with contrast	6	Alternative to CTA. Unable to detect calcium. Site-specific expertise important. See statement regarding contrast in text under "Anticipated Exceptions."	O
<p>Rating Scale: 1, 2 Usually not appropriate; 3, 4 May be appropriate; 5, 6 Usually appropriate; 7, 8 Usually appropriate; 9 Usually appropriate</p>			
*Relative Radiation			

Radiologic Procedure	Rating	planning.	Comments	RRL*
FDG-PET/CT abdomen	2			☢☢☢☢
Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate				*Relative Radiation Level

Note: Abbreviations used in the table are listed at the end of the "Major Recommendations" field.

Summary of Literature Review

Introduction/Background

Clinical palpation of a pulsating abdominal mass alerts the clinician to the presence of a possible abdominal aortic aneurysm (AAA), a common vascular disorder seen in older individuals, more commonly in male patients with a history of hypertension and smoking. However, the finding of a pulsatile abdominal mass can also be caused by a tortuous abdominal aorta or transmitted pulsations from the aorta to a nonvascular mass.

Generally an arterial aneurysm is defined as a localized arterial dilatation $\geq 50\%$ greater than the normal diameter. The term ectasia is applied to arterial dilatations $< 50\%$ of expected normal diameter. However, the normal dimension of the infrarenal abdominal aorta is up to 2 cm in anteroposterior (AP) diameter. Thus, the infrarenal abdominal aorta is considered aneurysmal if it is ≥ 3 cm in diameter or ectatic between 2 and 3 cm in diameter. The absolute threshold for aneurysm decreases along the length of the aorta and is about 10% smaller in women than in men.

Imaging studies are important in diagnosing the cause of a pulsatile abdominal mass and, if an AAA is found, in determining its size; involvement of abdominal branches, both visceral and parietal; and any associated significant stenosis or aneurysm involving abdominal visceral and extremity arteries. Imaging studies should also categorize the extent of aneurysm (i.e., infrarenal aorta; infrarenal aorta and iliac, isolated iliac, juxtarenal, suprarenal, or thoracoabdominal aorta). Imaging can also be used for routine surveillance of AAAs.

Currently, elective repair is considered for AAAs ≥ 5.5 cm in diameter. For smaller AAAs, periodic surveillance is recommended at intervals based on their maximum size: every 6 months for those 4.5–5.4 cm in diameter, every 12 months for those 3.5–4.4 cm in diameter, every 3 years for those 3.0–3.4 cm in diameter, and every 5 years for those 2.6–2.9 cm in diameter.

Population-based ultrasound (US) screening studies have been recommended for male patients > 65 years of age. Risk for AAA increases with a history of hypertension and smoking. For AAAs between 3 and 5.5 cm in diameter, periodic US or computed tomography (CT) imaging at 6- to 12-month intervals dependent on rate of aneurysm enlargement on prior studies is recommended. When aneurysms have reached the size threshold for intervention (5.5 cm) or are considered clinically symptomatic, additional preintervention imaging studies should be performed to help define the optimal surgical or endovascular approach. For preintervention studies, multidetector CT (MDCT) or CT angiography (CTA) is the optimal choice. Magnetic resonance angiography (MRA) may be substituted if CT cannot be performed (for example, because of the patient's allergy to iodinated contrast). However, MRA is usually performed with gadolinium contrast, which is not suitable for patients with severe renal insufficiency. In such patients, the center where it is being performed must be able to perform MRA of AAA without the use of gadolinium contrast.

Other types of imaging studies that have been used in the past to delineate AAAs—including abdominal radiographs, intravenous urography and blood pool radionuclide imaging—are not recommended for diagnosis, surveillance or preintervention imaging.

Catheter arteriography has very limited utility in the preintervention evaluation of patients with AAAs, its sole utility being in patients with significant contraindications to both CTA (significant renal dysfunction) and MRA (significant renal dysfunction, cardiac pacemakers, claustrophobia). In patients with significant renal dysfunction, the combination of noncontrast CT and the lower load of iodinated contrast material that can be used with intra-arterial injection can decrease the risk of contrast-induced nephropathy.

Many imaging studies for assessing AAA can also identify other disease that could affect preoperative management of AAA, such as coronary artery disease and thoracic aortic aneurysm. Screening for AAA can also be performed during unrelated imaging studies, such as transthoracic echocardiography, peripheral vascular US, and imaging studies to assess coronary artery disease and stroke or transient ischemic attack.

Ultrasound

US examination of the abdominal aorta should be a dedicated examination and not a component of a generalized abdominal US study. If possible, complete longitudinal evaluation of the full extent of the aneurysm and involvement of common iliac arteries should be performed. These studies should include a measurement of the leading-edge-to-leading-edge anteroposterior diameter in the proximal, mid, and distal infrarenal aorta and of the common iliac arteries. Lining mural thrombus should be delineated. Right and left kidneys should be imaged to determine size, parenchymal

thickness, and presence or absence of hydronephrosis. In order to permit US to be used instead of CT for AAA follow-up, interindividual reproducibility of diameter measurements should be within ≤ 4 mm. US tends to underestimate the size of aneurysms by 4 mm compared to CTA. Color Doppler imaging is not a necessary component of sonographic screening or surveillance examination. New, 3-dimensional (3D) volumetric US techniques offer similar measurements but speed up imaging significantly.

Approximately 5% of AAAs will be juxtarenal or juxta/suprarenal, and it may not be possible to accurately delineate the upper margin of such aneurysms or the precise involvement of abdominal visceral branches by sonographic study. That is why a more definitive study, such as CTA, should be performed prior to intervention.

Computed Tomography

Noncontrast CT is diagnostically equivalent to US for AAA detection and is recommended in patients for whom US is not suitable (for example, those with obese body habitus). CT may be used as a diagnostic and preintervention study, suitable for patients presenting with pulsatile abdominal mass with or without clinical suspicion of contained aortic rupture, and in planning endovascular or surgical intervention in patients with AAAs >5.5 cm in external AP diameter. In tortuous aneurysms, where a single dimension may be artifactually accentuated by the curvature of the aorta, the short-axis diameter of the aorta may be substituted for the AP diameter.

Contrast-enhanced multidetector CTA is the best diagnostic and preintervention planning study, accurately delineating the location, size, and extent of aneurysm and the involvement of branch vessels, allowing for accurate quantitative 3D measurements. CTA can also assess thrombus in aneurysm. Larger thrombus and eccentric thrombus seem associated with rapid enlargement of the aneurysm and increased incidence of cardiovascular events. There are several research protocols that use modern CT technologies. Multiphase MDCT can assess compressibility of thrombus that can act as a biomechanical buffer. Using delayed imaging, aortic wall enhancement is associated with AAA diameter, biochemical markers of inflammation, and thrombus size. Short-term follow up by CTA does not decrease the suitability of aneurysms for endovascular intervention.

In patients with suspected thoracoabdominal aortic aneurysm, CTA may be tailored for an angiographic examination of the chest, abdomen, and pelvis. In patients with suspected coexistent lower-extremity arterial disease, the arterial system from the diaphragm to the feet can be studied with MDCT or CTA.

Volume rendering, subvolume maximum intensity projection (MIP), and curved planar reformations are integral components of the 3D analysis. Semiautomated measurements of vessel diameter and length in relation to the proximal and distal aneurysm margins and branch vessels can be readily obtained with software supplied by multiple vendors. Additional research methods include electrocardiography (ECG)-gated MDCT that can assess decreased distensibility of aortic aneurysms. Advanced postprocessing of CT data can assess wall stress. Rapidly expanding AAAs have higher shoulder and wall stress. Calcification of the aneurysm increases wall stress and decreases the biomechanical stability of AAA. AAA peak wall stress at maximal blood pressure is higher in symptomatic or ruptured aneurysms compared to asymptomatic aneurysms.

In patients with suspected contained rupture, nonintravenous contrast-enhanced CT is performed to better diagnose dissecting hematoma in the lining of the intra-aortic thrombus (the crescent sign) and other signs consistent with imminent or contained rupture, including a draped aorta and adjacent vertebral erosion. In patients who have contained rupture, a rapid CT angiographic study provides a template for decision making about endovascular aneurysm repair or surgical aneurysmectomy.

Magnetic Resonance Angiography

Contrast-enhanced MRA is an alternative and effective diagnostic and preintervention study. The acquisition speed and spatial resolution of contrast-enhanced MRA has improved with the introduction of parallel imaging techniques, narrowing the gap with CTA in relation to image quality. The introduction of blood pool contrast agents now enables longer image acquisition to improve image resolution. Caution should be used in patients with severe renal dysfunction, generally considered as estimated glomerular filtration rate (GFR) <30 mL/kg/minute, who may be at risk for nephrogenic systemic fibrosis. In these patients, a non-contrast-enhanced study may be substituted. Sequences and imaging expertise required for a full evaluation of AAA without contrast are becoming more mainstream.

Three-dimensional display techniques, including multiplanar reformation, MIP display, and volume rendering, are integral to the display and analysis of 3D MRA. Cine techniques can also assess distensibility and, with suitable measurements of central venous pressure, can assess aortic compliance. Vessel wall shear stress can also be measured using newer 4D flow-sensitive MRI techniques.

Catheter Arteriography

Patients with significant contraindications to both CTA and MRA may have diagnostic catheter arteriography performed with a relatively low contrast material load following US documentation of AAA and/or noncontrast CT findings.

Catheter arteriography may not demonstrate the aneurysm diameter accurately, as only the contrast column of an aneurysm containing lining mural thrombus may be displayed. In patients with marginal renal function, rapid intra-arterial injection of a relatively low volume of dilute contrast material from a catheter located in the mid descending thoracic aorta can be used for a diagnostic CTA study.

Positron Emission Tomography

Although primarily a research tool, positron emission tomography using fluorine-18-2-fluoro-2-deoxy-D-glucose (FDG-PET) imaging has promise in the evaluation of patients with AAA. Increased metabolic activity and FDG uptake ($SUV_{max} > 2.5$) is noted in aneurysms and even higher in inflammatory aneurysms and symptomatic aneurysms and correlates well with histologic and metabolic evidence of inflammation. Increased FDG uptake is also seen in areas of high wall stress and rupture. Aneurysm calcification is unrelated to FDG uptake.

Summary

- The consensus of the literature supports aortic US as the initial imaging modality of choice when a pulsatile abdominal mass is present. Noncontrast CT may be substituted in patients for whom US is not suitable (for example, those with obese body habitus).
- US is recommended as a screening technique in the Medicare-eligible male population at highest risk.
- For definitive diagnosis and preintervention imaging, CTA and MRA are recommended.
- Currently, CTA is regarded as the superior test, as it is readily available, is robust, and provides high spatial resolution 3D displays suitable for interventional planning as well as delineation of pathology in abdominal visceral arterial branches and extremity outflow vessels.
- Contrast-enhanced MRA has improved significantly in terms of speed and spatial resolution with the advent of parallel processing techniques and blood pool contrast agents. It may replace CTA for interventional planning in patients for whom iodinated contrast is contraindicated.
- Noncontrast MRA sequences for full evaluation of AAA are becoming more mainstream and should only be performed in centers with expertise in this technique.
- Appropriate preintervention measurements of the aortoiliac arterial system can be obtained with either technique.
- Both CTA and MRA can be used for thoracoabdominal aortic and extremity studies, all in the same imaging session.
- FDG-PET remains primarily a research tool but shows promise for assessing the metabolic activity of aneurysms.

Anticipated Exceptions

Nephrogenic systemic fibrosis (NSF) is a disorder with a scleroderma-like presentation and a spectrum of manifestations that can range from limited clinical sequelae to fatality. It appears to be related to both underlying severe renal dysfunction and the administration of gadolinium-based contrast agents. It has occurred primarily in patients on dialysis, rarely in patients with very limited glomerular filtration rate (GFR) (i.e., <30 mL/min/1.73 m²), and almost never in other patients. There is growing literature regarding NSF. Although some controversy and lack of clarity remain, there is a consensus that it is advisable to avoid all gadolinium-based contrast agents in dialysis-dependent patients unless the possible benefits clearly outweigh the risk, and to limit the type and amount in patients with estimated GFR rates <30 mL/min/1.73 m². For more information, please see the American College of Radiology (ACR) Manual on Contrast Media (see the "Availability of Companion Documents" field).

Abbreviations

- CT, computed tomography
- CTA, computed tomography angiography
- FDG-PET, fluorine-18-2-fluoro-2-deoxy-D-glucose positron emission tomography
- MRA, magnetic resonance angiography
- US, ultrasound

Relative Radiation Level Designations

Relative Radiation Level*	Adult Effective Dose Estimate Range	Pediatric Effective Dose Estimate Range
O	0 mSv	0 mSv
☼	<0.1 mSv	<0.03 mSv
☼ ☼	0.1-1 mSv	0.03-0.3 mSv
☼ ☼ ☼	1-10 mSv	0.3-3 mSv
☼ ☼ ☼ ☼	10-30 mSv	3-10 mSv

Relative Radiation Level*	Adult Effective Dose Estimate Range	Pediatric Effective Dose Estimate Range
*RRL assignments for some of the examinations cannot be made, because the actual patient doses in these procedures vary as a function of a number of factors (e.g., region of the body exposed to ionizing radiation, the imaging guidance that is used). The RRLs for these examinations are designated as “Varies.”		

Clinical Algorithm(s)

Algorithms were not developed from criteria guidelines.

Scope

Disease/Condition(s)

Pulsatile abdominal mass, suspected abdominal aortic aneurysm (AAA)

Guideline Category

Diagnosis

Evaluation

Clinical Specialty

Emergency Medicine

Family Practice

Geriatrics

Internal Medicine

Radiology

Intended Users

Health Plans

Hospitals

Managed Care Organizations

Physicians

Utilization Management

Guideline Objective(s)

To evaluate the appropriateness of initial radiologic examinations for a pulsatile abdominal mass, suspected abdominal aortic aneurysm (AAA)

Target Population

Patients with pulsatile abdominal mass

Interventions and Practices Considered

1. Ultrasound (US) aorta abdomen
2. Computed tomography (CT) abdomen without contrast
3. Computed tomographic angiography (CTA) abdomen with contrast
4. Magnetic resonance angiography (MRA) abdomen
 - Without contrast
 - Without and with contrast
5. Aortography abdomen
6. Fluorine-18-2-fluoro-2-deoxy-D-glucose positron emission tomography (FDG-PET)/CT abdomen

Major Outcomes Considered

Utility of radiologic examinations in differential diagnosis

Methodology

Methods Used to Collect/Select the Evidence

Searches of Electronic Databases

Description of Methods Used to Collect/Select the Evidence

Literature Search Procedure

The Medline literature search is based on keywords provided by the topic author. The two general classes of keywords are those related to the condition (e.g., ankle pain, fever) and those that describe the diagnostic or therapeutic intervention of interest (e.g., mammography, MRI).

The search terms and parameters are manipulated to produce the most relevant, current evidence to address the American College of Radiology Appropriateness Criteria (ACR AC) topic being reviewed or developed. Combining the clinical conditions and diagnostic modalities or therapeutic procedures narrows the search to be relevant to the topic. Exploding the term "diagnostic imaging" captures relevant results for diagnostic topics.

The following criteria/limits are used in the searches.

1. Articles that have abstracts available and are concerned with humans.
2. Restrict the search to the year prior to the last topic update or in some cases the author of the topic may specify which year range to use in the search. For new topics, the year range is restricted to the last 5 years unless the topic author provides other instructions.
3. May restrict the search to Adults only or Pediatrics only.
4. Articles consisting of only summaries or case reports are often excluded from final results.

The search strategy may be revised to improve the output as needed.

Number of Source Documents

The total number of source documents identified as the result of the literature search is not known.

Methods Used to Assess the Quality and Strength of the Evidence

Weighting According to a Rating Scheme (Scheme Given)

Rating Scheme for the Strength of the Evidence

Strength of Evidence Key

Category 1 - The conclusions of the study are valid and strongly supported by study design, analysis, and results.

Category 2 - The conclusions of the study are likely valid, but study design does not permit certainty.

Category 3 - The conclusions of the study may be valid, but the evidence supporting the conclusions is inconclusive or equivocal.

Category 4 - The conclusions of the study may not be valid because the evidence may not be reliable given the study design or analysis.

Methods Used to Analyze the Evidence

Systematic Review with Evidence Tables

Description of the Methods Used to Analyze the Evidence

The topic author drafts or revises the narrative text summarizing the evidence found in the literature. American College of Radiology (ACR) staff draft an evidence table based on the analysis of the selected literature. These tables rate the strength of the evidence for all articles included in the narrative text.

The expert panel reviews the narrative text, evidence table, and the supporting literature for each of the topic-variant combinations and assigns an appropriateness rating for each procedure listed in the table. Each individual panel member forms his/her own opinion based on his/her interpretation of the available evidence.

More information about the evidence table development process can be found in the ACR Appropriateness Criteria® Evidence Table Development document (see the "Availability of Companion Documents" field).

Methods Used to Formulate the Recommendations

Expert Consensus (Delphi)

Description of Methods Used to Formulate the Recommendations

Modified Delphi Technique

The appropriateness ratings for each of the procedures included in the Appropriateness Criteria topics are determined using a modified Delphi methodology. A series of surveys are conducted to elicit each panelist's expert interpretation of the evidence, based on the available data, regarding the appropriateness of an imaging or therapeutic procedure for a specific clinical scenario. American College of Radiology (ACR) staff distributes surveys to the panelists along with the evidence table and narrative. Each panelist interprets the available evidence and rates each procedure. The surveys are completed by panelists without consulting other panelists. The ratings are a scale between 1 and 9, which is further divided into three categories: 1, 2, or 3 is defined as "usually not appropriate"; 4, 5, or 6 is defined as "may be appropriate"; and 7, 8, or 9 is defined as "usually appropriate." Each panel member assigns one rating for each procedure per survey round. The surveys are collected and the results are tabulated, de-identified and redistributed after each round. A maximum of three rounds are conducted. The modified Delphi technique enables each panelist to express individual interpretations of the evidence and his or her expert opinion without excessive bias from fellow panelists in a simple, standardized and economical process.

Consensus among the panel members must be achieved to determine the final rating for each procedure. Consensus is defined as eighty percent (80%) agreement within a rating category. The final rating is determined by the median of all the ratings once consensus has been reached. Up to three rating rounds are conducted to achieve consensus.

If consensus is not reached, the panel is convened by conference call. The strengths and weaknesses of each imaging procedure that has not reached consensus are discussed and a final rating is proposed. If the panelists on the call agree, the rating is accepted as the panel's consensus. The document is circulated to all the panelists to make the final determination. If consensus cannot be reached on the call or when the document is circulated, "No consensus" appears in the rating column and the reasons for this decision are added to the comment sections.

Rating Scheme for the Strength of the Recommendations

Not applicable

Cost Analysis

A formal cost analysis was not performed and published cost analyses were not reviewed.

Method of Guideline Validation

Internal Peer Review

Description of Method of Guideline Validation

Criteria developed by the Expert Panels are reviewed by the American College of Radiology (ACR) Committee on Appropriateness Criteria.

Evidence Supporting the Recommendations

Type of Evidence Supporting the Recommendations

The recommendations are based on analysis of the current literature and expert panel consensus.

Benefits/Harms of Implementing the Guideline Recommendations

Potential Benefits

Selection of appropriate radiologic imaging procedures for evaluation of patients with pulsatile abdominal mass, suspected abdominal aortic aneurysm

Potential Harms

Gadolinium-based Contrast Agents

Nephrogenic systemic fibrosis (NSF) is a disorder with a scleroderma-like presentation and a spectrum of manifestations that can range from limited clinical sequelae to fatality. It appears to be related to both underlying severe renal dysfunction and the administration of gadolinium-based contrast agents. It has occurred primarily in patients on dialysis, rarely in patients with very limited glomerular filtration rate (GFR) (i.e., <30 mL/min/1.73 m²), and almost never in other patients. Although some controversy and lack of clarity remain, there is a consensus that it is advisable to avoid all gadolinium-based contrast agents in dialysis-dependent patients unless the possible benefits clearly outweigh the risk, and to limit the type and amount in patients with estimated GFR rates <30 mL/min/1.73 m². For more information, please see the American College of Radiology (ACR) Manual on Contrast Media (see the "Availability of Companion Documents" field).

Relative Radiation Level (RRL)

Potential adverse health effects associated with radiation exposure are an important factor to consider when selecting the appropriate imaging procedure. Because there is a wide range of radiation exposures associated with different diagnostic procedures, an RRL indication has been included for each imaging examination. The RRLs are based on effective dose, which is a radiation dose quantity that is used to estimate population total radiation risk associated with an imaging procedure. Patients in the pediatric age group are at inherently higher risk from exposure, both because of organ sensitivity and longer life expectancy (relevant to the long latency that appears to accompany radiation exposure). For these reasons, the RRL dose estimate ranges for pediatric examinations are lower as compared to those specified for adults. Additional information

regarding radiation dose assessment for imaging examinations can be found in the ACR Appropriateness Criteria® Radiation Dose Assessment Introduction document (see the "Availability of Companion Documents" field).

Contraindications

Contraindications

- Significant renal dysfunction is a contraindication for computed tomography angiography (CTA).
- Significant renal dysfunction, cardiac pacemakers, and claustrophobia are contraindications for magnetic resonance angiography (MRA).

Qualifying Statements

Qualifying Statements

The American College of Radiology (ACR) Committee on Appropriateness Criteria and its expert panels have developed criteria for determining appropriate imaging examinations for diagnosis and treatment of specified medical condition(s). These criteria are intended to guide radiologists, radiation oncologists, and referring physicians in making decisions regarding radiologic imaging and treatment. Generally, the complexity and severity of a patient's clinical condition should dictate the selection of appropriate imaging procedures or treatments. Only those examinations generally used for evaluation of the patient's condition are ranked. Other imaging studies necessary to evaluate other co-existent diseases or other medical consequences of this condition are not considered in this document. The availability of equipment or personnel may influence the selection of appropriate imaging procedures or treatments. Imaging techniques classified as investigational by the U.S. Food and Drug Administration (FDA) have not been considered in developing these criteria; however, study of new equipment and applications should be encouraged. The ultimate decision regarding the appropriateness of any specific radiologic examination or treatment must be made by the referring physician and radiologist in light of all the circumstances presented in an individual examination.

Implementation of the Guideline

Description of Implementation Strategy

An implementation strategy was not provided.

Institute of Medicine (IOM) National Healthcare Quality Report Categories

IOM Care Need

Getting Better

IOM Domain

Effectiveness

Identifying Information and Availability

Bibliographic Source(s)

Bibliographic Source(s)

Desjardins B, Rybicki FJ, Dill KE, Flamm SD, Francois CJ, Gerhard-Herman MD, Kalva SP, Mansour MA, Mohler ER III, Oliva IB, Schenker MP, Weiss C, Expert Panel on Vascular Imaging. ACR Appropriateness Criteria® pulsatile abdominal mass, suspected abdominal aortic aneurysm [online publication]. Reston (VA): American College of Radiology (ACR); 2012. 6 p. [65 references]

Adaptation

Not applicable: The guideline was not adapted from another source.

Date Released

1995 (revised 2012)

Guideline Developer(s)

American College of Radiology - Medical Specialty Society

Source(s) of Funding

The American College of Radiology (ACR) provided the funding and the resources for these ACR Appropriateness Criteria®.

Guideline Committee

Committee on Appropriateness Criteria, Expert Panel on Vascular Imaging

Composition of Group That Authored the Guideline

Panel Members: Benoit Desjardins, MD, PhD (*Principal Author*); Frank J. Rybicki, MD, PhD (*Panel Chair*); Karin E. Dill, MD (*Panel Vice-Chair*); Scott D. Flamm, MD; Christopher J. Francois, MD; Marie D. Gerhard-Herman, MD; Sanjeeva P. Kalva, MD; M. Ashraf Mansour, MD; Emile R. Mohler III, MD; Isabel B. Oliva, MD; Matthew P. Schenker, MD; Clifford Weiss, MD

Financial Disclosures/Conflicts of Interest

Not stated

Guideline Status

Note: This guideline has been updated. The National Guideline Clearinghouse (NGC) is working to update this summary.

Guideline Availability

The updated guideline is available from the [American College of Radiology \(ACR\) Web site](#) .

Print copies: Available from the American College of Radiology, 1891 Preston White Drive, Reston, VA 20191. Telephone: (703) 648-8900.

Availability of Companion Documents

The following are available:

- ACR Appropriateness Criteria®. Overview. Reston (VA): American College of Radiology; 2 p. Available from the [American College of Radiology \(ACR\) Web site](#) .
- ACR Appropriateness Criteria®. Literature search process. Reston (VA): American College of Radiology; 1 p. Available from the [ACR Web site](#) .
- ACR Appropriateness Criteria®. Evidence table development – diagnostic studies. Reston (VA): American College of Radiology; 2013 Nov. 3 p. Available from the [ACR Web site](#) .
- ACR Appropriateness Criteria®. Radiation dose assessment introduction. Reston (VA): American College of Radiology; 2 p. Available from the [ACR Web site](#) .
- ACR Appropriateness Criteria® Manual on contrast media. Reston (VA): American College of Radiology; 90 p. Available from the [ACR Web site](#) .
- ACR Appropriateness Criteria®. Procedure information. Reston (VA): American College of Radiology; 1 p. Available from the [ACR Web site](#) .
- ACR Appropriateness Criteria® pulsatile abdominal mass, suspected Abdominal Aortic Aneurysm. Evidence table. Reston (VA): American College of Radiology; 25 p. Available from the [ACR Web site](#) .

Patient Resources

None available

NGC Status

This summary was completed by ECRI on February 20, 2001. The information was verified by the guideline developer on March 14, 2001. This summary was updated by ECRI on March 6, 2006. This summary was updated by ECRI Institute on May 17, 2007 following the U.S. Food and Drug Administration (FDA) advisory on Gadolinium-based contrast agents. This summary was updated by ECRI Institute on June 20, 2007 following the U.S. Food and Drug Administration (FDA) advisory on gadolinium-based contrast agents. This NGC summary was updated by ECRI Institute on June 8, 2010. This summary was updated by ECRI Institute on January 13, 2011 following the U.S. Food and Drug Administration (FDA) advisory on gadolinium-based contrast agents. This NGC summary was updated by ECRI Institute on November 8, 2012.

Copyright Statement

Instructions for downloading, use, and reproduction of the American College of Radiology (ACR) Appropriateness Criteria® may be found on the [ACR Web site](#) .

Disclaimer

NGC Disclaimer

The National Guideline Clearinghouse® (NGC) does not develop, produce, approve, or endorse the guidelines represented on this site.

All guidelines summarized by NGC and hosted on our site are produced under the auspices of medical specialty societies, relevant professional associations, public or private organizations, other government agencies, health care organizations or plans, and similar entities.

Guidelines represented on the NGC Web site are submitted by guideline developers, and are screened solely to determine that they meet the [NGC Inclusion Criteria](#).

NGC, AHRQ, and its contractor ECRI Institute make no warranties concerning the content or clinical efficacy or effectiveness of the clinical practice guidelines and related materials represented on this site. Moreover, the views and opinions of developers or authors of guidelines represented on this site do not necessarily state or reflect those of NGC, AHRQ, or its contractor ECRI Institute, and inclusion or hosting of guidelines in NGC may not be used for advertising or commercial endorsement purposes.

Readers with questions regarding guideline content are directed to contact the guideline developer.